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**ALBERTA'S INFORMATION TECHNOLOGY  
& TELECOMMUNICATIONS  
INFRASTRUCTURE:  
Building on Our Strengths**

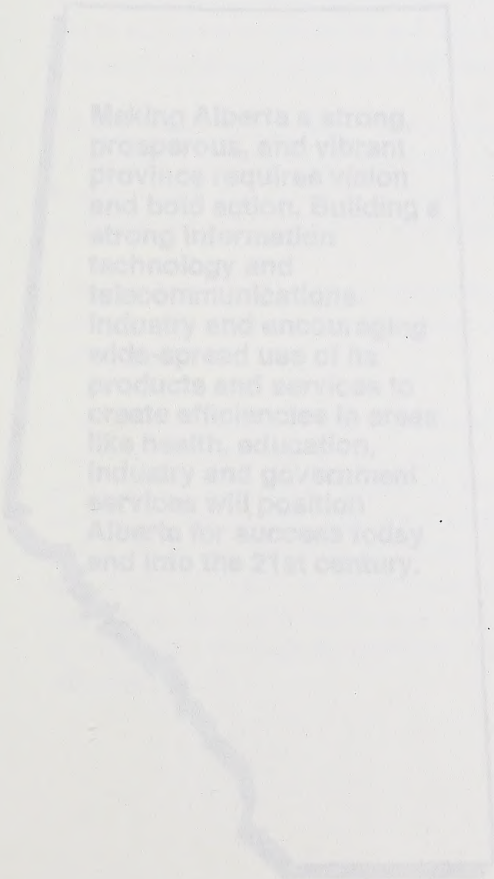
**March 16, 1995**





# ALBERTA'S INFORMATION TECHNOLOGY & TELECOMMUNICATIONS INFRASTRUCTURE

Building on Our Strengths



Making Alberta a strong, prosperous, and vibrant province requires vision and bold action. Building a strong information technology and telecommunications industry and encouraging wide-spread use of its products and services to create efficiencies in areas like health, education, industry and government services will position Alberta for success today and into the 21st century.

## **ALBERTA'S INFORMATION TECHNOLOGY & TELECOMMUNICATIONS INFRASTRUCTURE: Building on Our Strengths**

**March 16, 1995**

By  
**Dr. Marshall M. Williams**

March 16, 1995



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# ALBERTA'S INFORMATION TECHNOLOGY & TELECOMMUNICATIONS INFRASTRUCTURE

## Building on Our Strengths

Hon. Dennis Mosh  
Minister Responsible for Science and Research  
423 Legislature Building  
Edmonton, Alberta T5K 2B6

Dear Mrs. Mosh:

In the fall of 1994 you asked me to provide advice to the Alberta government on its information technology and telecommunications. After an extensive literature review and several interviews with representatives of Alberta's information technology and telecommunications industry, I have come very close to strong action is needed soon.

**Making Alberta a strong, prosperous, and vibrant province requires vision and bold action. Building a strong information technology and telecommunications industry and encouraging wide-spread use of its products and services to create efficiencies in areas like health, education, industry and government services will position Alberta for success today and into the 21st century.**

**By**  
**Dr. Marshall M. Williams**

March 16, 1995

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March 16, 1995

Hon. Dianne Mirosh  
Minister Responsible for Science and Research  
423 Legislature Building  
Edmonton, Alberta T5K 2B6

Dear Mrs. Mirosh:

In the fall of 1994 you asked me to provide advice to the Alberta government on its approach to information technology and telecommunications. After an extensive literature search and several interviews with representatives of Alberta's information technology and telecommunications industry, it has become very clear that strong action is needed soon.

Alberta, while having many basic strengths, is falling behind many other jurisdictions in developing a leading edge information technology industry and in applying the technology in government and industry. Without prompt action, Alberta will remain behind and forego an opportunity to significantly strengthen its competitive position and social well-being.

The province needs strong leadership, greater coordination and partnership between industry, government and academia, accountability measures in these sectors, and an action plan.

It is with concern over the short timeframe within which Alberta can effect positive and dramatic change, that I have taken the liberty of suggesting an action plan for the government. This plan focuses on three goals: (1) create a culture of use by raising awareness, developing new applications for the technology, addressing regulatory and policy issues and ensuring affordable access to networks; (2) ensure the necessary tools are available, such as interconnected, interoperable networks, a computer literate population, and useful public applications; and, (3) create the opportunity for all Albertans to add value through partnerships and cooperation to use resources and talent more effectively.

I hope you find this report informative and a contribution to the advancement of Alberta's economic prosperity and social well-being supported by a vital telecommunications and information technology sector.

Sincerely,



Marshall M. Williams

Enclosure



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# Terms of Reference

In *Seizing Opportunity*, Alberta recognized the need to “look beyond conventional tools to promote economic growth. Research and development facilities, communication networks, and related infrastructure will be targeted as a priority to build our knowledge-based economy.”<sup>1</sup> Consequently, the Premier’s Council on Science and Technology was asked to provide advice to the Government of Alberta in the area of information technology and telecommunications. This request was reiterated by the Minister Responsible for Science and Research upon formation of the Science and Research Authority. The Minister called upon Dr. Marshall M. Williams to provide this advice because of his extensive involvement with the Premier’s Council and because he was the Chairman of its task force on high performance computing. The Minister asked that advice be targeted principally at three issues:

1. Determining the general views of industry leaders on the current status of Alberta’s telecommunications and information technology infrastructure;
2. Determining which other jurisdictions (both in Canada and abroad) should be monitored more closely by Alberta; and,
3. Recommending an action plan for the Alberta government that will enhance telecommunications and information technology activity in the province.

This report was prepared in the fall and winter of 1994 under the direction of Dr. Marshall M. Williams, to clarify the issues government must address. It does not address matters better left to the private sector.

Interviews with Alberta representatives and professionals in telecommunications and information technology were conducted and an extensive literature search undertaken. Appendix 4 contains the names of those interviewed for this report and Appendix 5 includes a list of references. The findings of this report have exposed several important and urgent challenges for the Alberta government.

To support its findings, this report examines the development of Alberta’s information infrastructure by:

1. evaluating the strengths and weaknesses of Alberta’s infostructure;
2. pointing to other jurisdictions that may serve as models for Alberta; and,
3. proposing a strategy to ensure the telecompetitive position of Alberta in the Canadian and global environments.

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<sup>1</sup> *Seizing Opportunity: Alberta’s New Economic Development Strategy* (1993), p. 5.



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# Alberta Information Technology & Telecommunications Action Plan

## **Vision Statement:**

Alberta will be a leader in the development and use of information technology and telecommunications empowering Albertans to seize opportunities for personal, social and economic growth.

## **GOALS:**

### **#1: Create a Culture of Use**

- raise awareness through education
- develop applications
- ensure equity of access
- address policy issues
- address regulatory issues

### **#2: Ensure Tools are Available**

- create a world-class infrastructure
- provide adequate training and education
- promote the creation of applications & content

### **#3: Create the Opportunity to Add Value**

- provide leadership
- promote coordination and partnerships
- use everyone's expertise
- reduce duplication of efforts and cut costs

## **Immediate action required to:**

- achieve decentralization
  - reduce deficit and debt
  - generate growth
  - attract investment
  - create highly skilled jobs
  - provide new social development
-

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# Executive Summary

"Building on our traditional economic strengths is only the first step to creating new wealth in our province. We must look hard at the new growth opportunities, such as advanced technologies, and take steps now to position Alberta for future development."

*Seizing Opportunity*, p. 14.

## 2.1. Introduction

Alberta's geography and natural resources have been a source of both the province's prosperity and problems. With the emergence of advanced information and telecommunications technologies, our strengths can be enhanced and many of the barriers surmounted. However, despite Alberta's good head start in developing a leading infostructure - broadly defined as our total capabilities in the information technology and communications sector<sup>†</sup> - a lack of leadership, cooperation, and accountability has created the environment which is weakening the information infrastructure of the province. This issue requires immediate action before the window of opportunity for rectifying the problem closes.

## 2.2. Information Technologies, Telecommunications and *Seizing Opportunity*

Alberta's information technology and telecommunications industry is growing faster than the overall economy, however, it is dwarfed by the size of the industry in the rest of Canada, let alone that south of the border. Action must be taken now to ensure that Alberta can control its future prosperity and not have important assets, like its information and its ability to process and communicate information, removed from domestic influence.

Alberta's economic development plan, *Seizing Opportunity*, places strong emphasis on the strategic nature of information technology and telecommunications to wealth creation.<sup>2</sup> As several other jurisdictions already have placed strategic emphasis on this industry, the Alberta government's focus now needs to turn to the strategies required to make information technology and telecommunications an important part of Alberta's economic prosperity and social well-being.

## 2.3. Alberta's Infostructure Compared

Alberta's information technology and telecommunications representatives were interviewed regarding the state of Alberta's infostructure, the other jurisdictions Alberta should use as models, and the actions Alberta should take in addressing the province's challenges. The findings can be summarized as follows:

<sup>†</sup> "Infostructure" is defined in Appendix 8.1.

<sup>2</sup> *Ibid.*, p. 6.

1. **Converging technologies and industries are closing the province's window of opportunity.** Discussion with Alberta's industry leaders exposed several recurring themes the highlights of which included the following points. Many commented that because of rapid technological change, talking about information technology, cable, and telecommunications as separate industries is no longer accurate. They are rapidly converging to form one industry based on the collection, processing, and communication of information. This industry creates opportunities for and is critical to the success of all other industries and services while, at the same time, is an important industry in its own right. There is a strong consensus that while Alberta possesses many strengths, there are many serious weaknesses that must be addressed soon to avoid the province falling further behind other jurisdictions in these areas. Consequently, the government must become more aware of the needs of the information technology and telecommunications industry and develop a strategy to make it a key contributor to the Alberta economy. This strategy must encompass increasing awareness of the latest technology, its uses, and its potential for growth opportunities. It must provide a focus for coordination and partnering, and address regulatory and policy issues impeding the success and growth of the industry. Action is urgently needed at this time.
2. **Other jurisdictions are moving quickly.** As the information technology and telecommunications industry is global in scope (accounting for US\$ 1 trillion in 1993), the activities of other jurisdictions have profound effects on Alberta. Many other jurisdictions have undertaken significant action toward building their information infrastructures. New Brunswick has made significant progress in developing both broad awareness and a significant infrastructure. Singapore has used information technology and deregulation to make telecommunications account for over 50 percent of export revenue. Great Britain has also found telecommunications deregulation to be an effective stimulant to activity in the information technology sector. The United States has created a national Task Force and Advisory Council to assist in the formulation of a coherent national policy regarding their information infrastructure and just like Japan and Korea, has undertaken to make significant investments in their information highway. The actions of these jurisdictions are changing the way business and government operate to stimulate new economic growth and to more effectively serve social needs.



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3. **To continue to prosper, Alberta needs an action plan that stresses coordination, innovation and government leadership.** The action plan needed to catch up to and remain ahead of other jurisdictions requires greater coordination and partnership between government, business, and academia to train people on the use of the technologies, find new applications, and leverage the development of an information technology industry on Alberta's established corporate foundations. This will require strong government leadership to address policy issues, regulatory impediments, and promote a culture of use and research and development activities. Alberta needs a champion who will lead Albertans and our institutions into a highly competitive, information-based society.

## 2.4. The Alberta Action Plan

Part of the mandate of this report is to recommend an action plan focusing on broad strategic directions for the Alberta government to meet the urgent information technology and telecommunications needs of the province. All recommendations focus on the following vision:

Alberta will be a leader in the development and use of information technology and telecommunications, empowering Albertans to seize opportunities for personal, social and economic growth.

To achieve this vision and overcome Alberta's many challenges, the following three interrelated and interdependent goals are proposed with strategies to ensure their attainment.

### **Goal 1: Create a culture of use.**

Albertans must have the needed skills to effectively apply and use information technology and telecommunication to stimulate the activity of local industry, and result in more innovative applications of technology that will enhance economic performance and social well-being.

Creating a society of sophisticated users requires that the awareness of Albertans be raised regarding the benefits of information technology and telecommunications. This is most effectively done by developing useful applications, addressing the numerous regulatory and policy issues. In this

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way, rapid development and diffusion of the technology will be facilitated, access will be provided, and domestic information technology and telecommunications facilities, electronic information and services will be built.

**Goal 2: Ensure the necessary tools are available.**

Many tools are needed for the development and use of an infostructure. Interconnected, interoperable, and scalable networks, the necessary software tools, and people possessing the skills to use information technology, and to locate information resources and services are central. Alberta needs to create high-speed network connections faster, educate and train more people to use the technology and develop a sustainable local information technology and telecommunications industry.

Providing the necessary tools for an information economy requires the construction of a world-class infostructure. More high-speed telecommunications links must be build and made available, more training and educational opportunities offered and the development of new information products and services must be encouraged.

**Goal 3: Create the opportunity to add value.**

Albertans must be allowed to contribute to the development of the province's infostructure. It has the potential to have long-lasting and dramatic effects on Alberta and its place in the world. Only through cooperative, creative, and thoughtful work will any plan for creating general use and application of technology succeed and enhance Alberta's wealth creation and social well being.

For all Albertans to benefit from information technology and telecommunications the government must provide a vision. Government must lead by example while also encouraging the cooperation and partnerships between itself, Alberta's information technology industry, business, and academia. This will encourage new forms of economic growth in Alberta, while also reducing public expenditures and duplication by using technology more effectively.

## **2.7. Why Act Now?**

The development of an information technology and telecommunications

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sector and the diffusion of its products and services in the province is an undertaking of utmost importance. Aggressive use of information technology and telecommunications in Alberta will assist the government achieve its basic goals of decentralization, and deficit and debt reduction while also generating important domestic and global economic growth opportunities. The province will become more attractive to investment, will create highly-skilled jobs, provide new social development opportunities, and increase the effectiveness of the public service while reducing costs to the taxpayer. Other jurisdictions are using information technology and telecommunications in this way with great success.

There is a clear link between the development, diffusion, and use of an information and communications infrastructure and the improved competitive position of businesses using the technology effectively. The enabling effect information technology and telecommunications can have on all sectors of economic activity make these industries central to overall economic prosperity. Making these sectors a healthy and prosperous part of Alberta's economy will assist in achieving many of the objectives the Government established in its economic development strategy, *Seizing Opportunity*. Greater use of telecommunications and information technologies in Alberta will assist in wealth creation, deficit reduction, stimulated business growth, expanded exports, and strengthening society.<sup>3</sup>

There is also strong potential for improving the social well being of Albertans with greater application of information technology and telecommunications. Electronic access to educational, health, and other government information and services will improve the quality of life for Albertans. Essential services will be improved while also allowing for significant cost savings.

## 2.8. Summary

In light of rapid technological and economic change, it is crucially important that the state of Alberta's infostructure and the government's policy position be revised. An aggressive plan of action must be adopted by the Alberta government immediately. Alberta has a short time frame within which to create a world class infostructure. Not acting now risks the loss of an important opportunity that will impose economic and social costs for generations to come.





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# 1. Introduction

Alberta has many strengths upon which to build. However, we need to be cognizant of some significant obstacles. These include a relatively small domestic market, our distance from large export markets and the seaboard, and the relatively high cost of production and services. To overcome these obstacles and successfully compete abroad, Alberta needs to diligently apply the most effective methods available in such fields as science and technology, management systems, and telecommunications and information technologies.

We also have many strengths that can be greatly enhanced by applying these methods. These strengths include our large arable land base, large petroleum and coal reserves, extensive water resources, a promising tourist potential, a highly developed telecommunications and transportation infrastructure, excellent education and health facilities, resourceful people, low taxes, a substantial "knowledge base" and computer capacity. One of the most effective technology for Alberta to greatly enhance these strengths is telecommunications and information technology.

We need to have faith in our future and in ourselves, to believe in our capabilities, to build on our advantages and resources and to augment our skills and energy by utilizing the most effective technologies available to overcome any obstacles to economic and social progress.

Currently, one of the most serious challenges we face in Alberta is the lack of a coherent plan of action for developing our infostructure.<sup>1</sup> Ours is being developed slowly and in a less coordinated fashion than elsewhere.

This report will review the importance of information technology and telecommunications to the Alberta advantage. It will then examine Alberta's progress relative to other leading jurisdictions, pointing to our strengths and weaknesses as a province. Progress will be measured according to four elements that appear in the action plans of those jurisdictions successfully building an infostructure:

1. communications infrastructure;
2. information, services, and applications;
3. a significant culture of use; and,
4. government leadership.

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<sup>1</sup> See Appendix 1 for a definition of "infostructure".

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## 2. Information Technology, Telecommunications and *Seizing Opportunity*

"To meet the challenges, to confront the future, to keep Alberta strong, we require a new plan, an economic development strategy that positions Alberta to compete at the close of one century, and at the dawn of another."

- Premier Ralph Klein, April 22, 1993

"[I]t's worth remembering that while we talk about this digital revolution as if it is about to happen, in many places it is already underway."

- Vice President Al Gore  
January 11, 1994

The economic development strategy adopted by the Alberta government is articulated in *Seizing Opportunity*. This plan stresses the central place of information technology and telecommunications in Alberta's economic prosperity and social well-being. The Alberta government has recognized the "need to promote research and technology" and to "focus on competitiveness and innovation".<sup>2</sup> The government has recognized information technologies, telecommunications, and electronics as strategic opportunities for wealth creation.<sup>3</sup> As such, the Alberta government has committed itself to facilitating community-based economic development by providing the needed economic infrastructure.<sup>4</sup> As information technology and telecommunications become important tools for wealth creation around the world, Alberta must commit itself to leadership in these strategic technologies. As this report will show, Alberta's infostructure faces several challenges which need to be addressed promptly. With developing nations and post-industrial nations seizing onto information technology and telecommunications as important elements of their development strategy, Alberta must also seize the opportunity.

<sup>2</sup> *Seizing Opportunity*,

<sup>3</sup> *supra*, p. 6.

<sup>4</sup> *Ibid.*

*Ibid.*, p. 15.



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## 3. Alberta's Infostructure Compared

"As part of its business plan, government also identified a comprehensive set of goals: . . .  
- To prepare for the future of new electronic systems, fibre optics, communications and information technology."

- *Measuring Up*, p. 3.

### 3.1. Culture of Use

The successful development of an infostructure depends upon the widespread use of the networks and applications. Developing a culture of use amongst the public requires affordable and accessible services, the required education and training and numerous public applications.

According to Alberta's technology representatives, the province's efforts at developing a culture of use are either strengthened or weakened by the following factors:

#### Strengths

1. Alberta's energy sector, universities, colleges, and research community have created a large pool of labour skilled in the use of information technologies and telecommunications.
2. Alberta is the base of some very successful information technology and telecommunications research organizations in Canada.
3. Albertans are creating publicly accessible network on their own, such as the Edmonton and Calgary FreeNets, which give Albertans access to the internet at low cost.
4. According to a recent *Maclean's* magazine pole, 46 percent of Alberta homes have a personal computer; the highest penetration rate across Canada.<sup>5</sup> This shows Albertans are interested and ready for infostructure development. With the appropriate government leadership, this interest and base of technology skills can translate quickly into greater corporate and public use of technology.

#### Weaknesses

1. With insufficient network connections to schools, health care facilities, and government services, developing a culture of use amongst Albertans is not perceived by many to be as urgent an issue as it should be.
2. Due the low level of connectivity and the lack of publicly available information and services, those who want access to information and services face an environment of high costs and few local resources.
3. Because of a lack of exposure, Albertans are not participating in projects like the Federal government's Schoolnet project due to a lack of technology

<sup>5</sup> *Maclean's* (December 27, 1994).

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"There are those who say the lack of economic development causes poor telecommunications. I believe they have it exactly backwards. A primitive telecommunications system causes poor economic development."

- Vice President Al Gore  
March 21, 1994

resources and suitable planning of potential applications of these types of project within the Alberta educational curriculum.

4. There are no requirements for the development of a certain levels of computer competency in primary, secondary, or post-secondary curriculum.
5. Community-based efforts to develop a culture of use, like the Freenet projects, are limited in the technology and services they can offer because of funding and infrastructural limitations.

### **Models for Alberta**

Other jurisdictions that may be useful models for developing a culture of use in Alberta are New Brunswick, Singapore, France and the United States.

**New Brunswick.** Recently, Frank McKenna announced that legislation will be passed requiring students at all levels to possess a certain level of technology competency before graduating from their respective educational institution. Because of the broad availability of electronic services in the province, a basic level of competency is required to ensure that everyone has the knowledge needed to access and use the electronic government services. This is increasingly important as more and more government services are accessible via public information kiosk or home computer.

**Singapore.** By developing the significant infrastructure and several "anchor" applications described earlier, use of the infostructure and a demand for training increased measurably.

**France.** The Minitel system placed in businesses and homes throughout France, has made technology easily accessible and usable. According to the developers of the Minitel service, the creation of "informatics thinking" in the general public is critical to realizing the full benefits of the information economy.<sup>6</sup>

**United States.** A large user base is found in the United States, created by significant government and private sector funding for (1) the development of applications and training; (2) the construction of new networks and expansion of existing ones; and, (3) the strong encouragement of government in pursuing wealth creation and social development oppor-

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<sup>6</sup> Northern Telecom, *Telecompetitiveness Infostructure*, *supra*, p. 60.

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tunities through application of information and telecommunications technologies.

### **3.2. Information, Services and Applications**

A communications network can only serve people effectively if information, services and applications are developed and made available over the network. The most common applications of information technology and telecommunication involve electronic commerce, research, education and training, health services, government services, libraries, and environmental monitoring. For a more detailed discussion of these applications and examples of their use, please see Appendix 11.3: Activities in Alberta.

Alberta's telecommunications and information technology representatives observe that the province has the following strengths and weaknesses with regards to information, services and applications accessible over the networks:

#### **Strengths**

1. The development and deployment of electronic registry and land titles systems have facilitated more effective service to Albertans.
2. Some Alberta government departments are undertaking pilot projects or initiatives involving the electronic supply of information and services. They include topics such as electronic commerce, health and education. These are covered more in depth in Appendix 11.3.
3. Significant application of technology is being made in the private sector, particularly in the energy industry and research community. It is primarily upon these sectors that the information technology and telecommunications industry has been built in Alberta.

#### **Weaknesses**

1. Neither government information nor services are accessible on public networks. At the start of 1995, only three Alberta government departments are currently information providers on the Alberta community FreeNets or internet and few departments use the information or tools provided on the internet.
2. While fields like health and education are now aware that they need to make more extensive use of technology to effect greater cost savings and better



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service to remain competitive, they are behind. Many other jurisdictions have already made significant investments in their infostructures, building the networks, creating the applications, and integrating them with many program initiatives.

3. Schools and health facilities are lacking access to important electronic resources which are available globally and are increasingly important to economic and social development. Though approximately 120 Alberta schools are participating in projects such as the Federal government's Schoolnet project, most lack the physical capability to get involved in such ventures.
4. Government initiatives and pilot projects are not being coordinated to take advantage of cost savings or cooperative development efforts, such as using common development standards and constructing common networks for such services as health and education.
5. Alberta's information technology industry is small compared to that in other jurisdictions. It is consequently uncoordinated and lacking in important business skills.
6. Government wide access to electronic mail and information services is not yet available in a consistent fashion and does not allow for effective intergovernmental communication or information management and sharing.
7. Alberta does not have sufficient multimedia application trials compared to other jurisdictions. These applications include such applications as distance learning, and video on demand. These trials are crucial to improving technological capabilities and to providing new services and technologies.

### *Models for Alberta*

Other jurisdictions developing and using information, electronic services and applications may serve as useful models, for Alberta. These are British Columbia, the Federal government, Singapore, United States, and France.

**British Columbia.** Several government departments have jointly developed and implemented community networks which permit single-point access to electronic education, health and other government information and services.

**Canadian Federal Government.** The Federal government has created the

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Open Government Project which makes available government information and services over the internet. It allows the public to access some government personnel through electronic mail.

**Singapore.** Adhering to its *IT2000 Action Plan*, Singapore is developing three, interwoven tiers of services: (1) sectoral applications (such as Library 2000, Leisure Information and Reservation System, Public Information Kiosk Network, LawNet and TradeNet) which greatly add significant value to a sector's performance; (2) middleware services such as billing, security, and directory services which can be applied over all networks to reduce development costs and increase usability; and, (3) telecommunications network services that facilitate network interoperability and efficiency.

**The United States.** Extensive resources and applications are available in the U.S. Many industry sectors have developed their own applications and information archives. The federal government, and many state governments make their information easily accessible in electronic form. The federal government has electronic mail addresses for all government employees.

**France.** As of 1993, there were over 20,000 public information services available over the Minitel system, a home-based computer console. Companies have developed over 15,000 additional applications for internal use. France is now attempting to develop the technology to offer multimedia services over the system.

### **3.3. Communications Infrastructure**

Central to an effective infostructure is an accessible, high-speed, communications network that facilitates the sharing of information and makes available new products and services. The development of such an infrastructure requires the availability of fibre optic, microwave and satellite networks at rates that will promote wide usage.

Alberta's telecommunications and information technology representatives observe that the province's network has the following strengths and weaknesses:

#### **Strengths**

1. A fully digitally switched telecommunications infrastructure which enables

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the fast redirection of message signals and provides state of the art voice communications.

2. Several high speed transmission lines throughout Alberta which enables the rapid movement of data.
3. Several network systems, three of which are maintained by the Alberta government covering 90 percent of Alberta, a telecommunications network with 98 percent penetration and a cable network with 97 percent penetration.
4. A high-performance computer centre located in Calgary (HPCC) that has enabled Alberta companies to be short listed for many international contracts.
5. Many world class telecommunications and information technology research and development and manufacturing initiatives in Alberta such as Alberta Microelectronics Centre, TRILabs and Northern Telecom.

### **Weaknesses**

1. Insufficient publicly accessible, network connections to high speed telecommunications links (T-1 and T-3 fibre optic links, and microwave and satellite links) restricts the degree of available access to, and the amount of, electronic resources.
2. Other than the Universities of Alberta, Calgary, Lethbridge and Athabasca, and the Alberta Research Council, there are few high-speed data network connections for other educational, health or government facilities. This reduces the likelihood of a broadly-based culture of use emerging in the province or the development of many Alberta-based resources.
3. High tariff rates for telecommunications data traffic that has lost Alberta companies international contracts and that have imposed near-prohibitive costs to developing effective applications in education or health services thereby failing to facilitate remote delivery of services at reduced rates.<sup>7</sup>
4. Insufficient interconnection between telecommunications and cable networks impose higher network development costs.
5. Limited network access to the supercomputer at HPCC for both Alberta and extra-provincial markets. As the only computer of its kind in Canada, it is an underutilized national resource.

<sup>7</sup> Telecommunications rates are under federal jurisdiction, within the regulatory purview of the Canadian Radio-Television and Telecommunications Commission.



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## Models for Alberta

Other jurisdictions with significant communications infrastructure may be useful models, which would assist the Alberta government establish a position on future development priorities. These are New Brunswick, Singapore, France, and the United States.

**New Brunswick.** This province is the first jurisdiction in North America to develop a completely fibre optic, digitally switched communications network. Network systems are openly accessible. This has facilitated significant investment and business expansion. New Brunswick has become the preferred location for call centres in North America. The infrastructure investment was also central to the development of many applications for education, health care, and social services.

**Singapore.** This island nation earns more than 50 percent of export revenue from telecommunications traffic because of its low telecommunication rates and superb network system. This has also encouraged the development of several private and public sector network applications that have made Singapore the best integrated telecommunications and information technology centre in the world.

**France.** France currently possesses the largest packet switching network in the world, with almost 100 percent of all traffic digitally switched. France Telecom has announced it is spending US\$5 billion to upgrade the network to asynchronous transfer mode (ATM) fast packet switching technology which will increase the rates and volumes at which data can be transmitted.

**United States.** The high degree of competition has resulted in low telecommunications rates and rapid technological innovation. Analysts expect that the interconnection of cable and telecommunications networks will allow the United States to have a fully operational national infrastructure 5 to 10 years ahead of any other country. Currently, in many cities it is possible to access the internet with cable TV access.<sup>8</sup>

## 3.4. Government Leadership

Central to the success of many infrastructures has been the role assumed by government. Typically, this role involves providing a vision for the future, having

<sup>8</sup> Nelson Bokerman,  
"George Gilder's Telecosm:  
"Washington's Bogeymen."  
(1994) *Forbes ASAP*: 115-42.

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a high-profile champion, making the government a model user and information provider, becoming a facilitator of cooperation and coordination amongst stakeholders, and providing targets for industry and social institutions to work towards.

Alberta's telecommunications and information technology representatives observe that leadership in the province has exhibited the following strengths and weaknesses:

### **Strengths**

1. Government departments are beginning to work closely with their stakeholder groups to find ways to incorporate information technology and telecommunications into the policy implementation process.
2. Some of Alberta's MLA's have started touring the province to gather opinions and formulate an response on specific issues such as education policy.
3. The Alberta government is currently involved in several pilot projects or initiatives in the province. See appendix 8.3 for greater details.

### **Weaknesses**

1. The Alberta government lacks a coherent strategy for applying information technologies or associated services and for developing an information technology and telecommunications industry.
2. Alberta possesses a small and inadequately organized information technology industry relative to other jurisdictions. The government has taken limited action to facilitate growth in the information technology industry and has focused on the hardware components of the industry at the expense other segments of the industry, such as software.
3. There are no accountability measures against which the province's performance is measured and towards which efforts are directed.
4. The Alberta government is not gathering the statistics required to create any meaningful accountability measures regarding the strengths or weaknesses in the information technology and telecommunications industry, the diffusion of technologies, or the effect of information technology and telecommunications on other markets and services.
5. Despite being the largest single consumer of information technology and

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telecommunications in Alberta, the provincial government has not committed to being a model user or information provider. This market power has the potential to do much to shape the evolution of the industry in the province.



## 4. What is Needed?

"If Canada is to succeed in a global economy based on the creation, movement, storage, retrieval and application of information, our communications networks must be knitted into a seamless and powerful information infrastructure serving all Canadians."

- Industry Canada, *The Canadian Information Highway*, p. 4.

Alberta has the potential to surpass the efforts of other jurisdictions if it acts soon. The window of opportunity for developing a world class infostructure is closing. Many developing countries and all post-industrial nations are rapidly developing state-of-the-art infrastructures. To regain Alberta's lead in telecommunications and information technology, What is required is:

- the development of a vision and the implementation of an action plan aimed at attaining that vision;
- leadership and championship by the Alberta government; and,
- greater cooperation and coordination between industry, Academia and government.

### 4.1 Need for Leadership

The Alberta government must exhibit leadership at this time. As one of the largest consumers of information technology and telecommunications in the province, spending approximately \$160 million in fiscal 1994-95,<sup>9</sup> and as one of its largest information providers, the government has a responsibility to ensure (1) it is using technology most effectively; (2) that world-class telecommunications and information technology industries develop in Alberta; and, (3) they are widely accessible to everyone at a reasonable cost.

The infostructure initiatives undertaken in many other jurisdictions demonstrate the success of coordinated and cooperative action by industry, government, and academia in leveraging the development of a domestic information technology and telecommunications industry on existing industries. These jurisdictions have created advisory councils, task forces, and ministries to establish priorities, develop incentives programs, and new tax policies that will lead to the timely and balanced development of an infostructure. Many also have a champion who is focusing those leadership efforts. One of the best examples is Premier Frank McKenna of New Brunswick.

Exemplifying the leadership required, Premier Frank McKenna recently wrote,

I had to show New Brunswickers that I was personally committed to taming the new technology. . . . And the gamble is still paying dividends.

The New Brunswick Government is changing itself and, in the process, acting as the catalyst for business growth. We're on several

<sup>9</sup> From the December 15, 1994 interview with Stan Petrica, Executive Director, Supply and Services, Alberta Public Works.

highway systems. We communicate via Talk-Mail, Internet E-mail as well as by local and wide area networks. We promote New Brunswick tourism and our electronic investment potential via World Wide Web, track our time through electronic calendaring, hold meetings via video-conferencing and manage information flow electronically.<sup>10</sup>

New Brunswick is only one of the governments that has exhibited leadership in information technology and telecommunications. Its plan of action and its Ministry for the Information Highway is complimented by the efforts of other Canadian jurisdictions who have placed information technology within their economic development strategies. The Centre de recherche informatique de Montreal (CRIM) ensures levels of research and development in the information technology sector lead to more commercialized products. Ontario's Advisory Council on the Computing Sector (ACCS) was charged in 1993 with developing a strategy for growing Ontario's information technology sector. Ontario also produced another action plan entitled, *Telecommunications: Enabling Ontario's Future*. Nova Scotia's information technology community banded together with government to create the NovaKnowledge initiatives to build the domestic industry. British Columbia has a number of organizations and institutes aimed at developing the information technology industry. Saskatchewan's government has directed \$600 million in procurement contracts to the development of exportable information technology, and have formed the Software Technology Centre along with industry and academia. The Federal government released *The Canadian Information Highway: Building Canada's Information Technology and Telecommunications Infrastructure*, a paper exploring how best to develop a strategy for Canada. The Canadian government appointed a national Advisory Council to create an information technology strategy and action plan and is examining its role as a model user and information provider by using the internet for the Open Government Project. It has also approved another \$80 million for CANARIE, an initiative to upgrade Canada's high-speed network system.

Internationally, the United States government has produced an, *Agenda for Action, Version 1.0*, which it is implementing through a National Information Infrastructure Task Force and Advisory Council. Other governments have formed policy positions and action plans which can be found in such documents as Singapore's *IT2000 Action Plan - From Vision to Reality*, The Bangermann Group's report, *Europe and the Global Information Society: Recommendations to the European Council*, Australia's Copyright Convergence Group "Issue Paper", and England's *Competition and Choice: Telecommunications Policy for the 1990s*. Other countries are also active. Japan's Ministry of Post and Telecommunications, Telecommunications Council intends to lead public and private sector initiatives

<sup>10</sup> Frank McKenna, "Foreword," in Jim Carroll and Rick Broadhead, *Canadian Internet Handbook*, 1995 edition, (Scarborough, ON: Prentice Hall Canada Inc., 1994), at p. xiii.

to wire the islands with fibre by 2010,<sup>11</sup> while the Republic of Korea's National Computerisation Agency has committed US\$50 billion to developing a national high speed network by 2005. China's Ministry of Posts and Telecommunications, too, is planning telecommunication and information technology sector activities which will connect all major cities with a 144Mbps fibre optic network by 1995.

The Government of Alberta does not have an action plan to develop the industry or an up to date policy position regarding information technologies and telecommunications. Alberta was once a leader in telecommunications and information technology, but if the province is to regain that position of technology leadership, a province wide strategy needs to be developed and implemented quickly.

## 4.2. Need for Coordination and Cooperation

"Our nation can and must meet this challenge. The best way to do so is by working together. Just as communications industries are moving to the unified information marketplace of the future, so must we move from the traditional adversarial relationship between business and government to a more productive relationship based on consensus."

- Vice President Al Gore  
January 11, 1994

Almost everyone who realizes the importance of an infostructure to the Alberta's prosperity is trying to contribute to its development. There must be a process established to ensure the success of their efforts, to assess how best they can help, and to clarify their role in the future development of the infostructure. This calls for a strategic plan to determine and designate the role of each stakeholder, clarifying who leads us through the different areas and stages of development.

In *Seizing Opportunity*, the Alberta Government has stated that

"There will be times when it will be necessary to enter into strategic alliances with industry in order to encourage specific economic development or diversification projects . . . . [by] sharing the risk between government and the private sector. . . . in exceptional circumstances and when success requires public involvement."<sup>12</sup>

The development of an infostructure is such an occasion. Government must not only champion the use of these technologies and exhibit leadership in its own right, but it must assist the private sector by coordinating efforts to ensure that Alberta's information technology sector becomes a significant contributor to the Alberta economy.

Alberta's information technology industry is small and uncoordinated. Alberta contains only 10 percent of the information technology industry in Canada. 80 percent is concentrated in Quebec and Ontario. 54 percent of Alberta's information technology firms have less than seven employees and over 45 percent of firms are less than five years old. 67 percent of information technology firms have revenues of less than \$500,000.<sup>13</sup> There is not a large enough commercial base in

<sup>11</sup> Ministry of Posts and Telecommunications, *Reforms Towards the Intellectually Creative Society of the 21st Century: Programs for the Establishment of High Performance Info-Communications Infrastructure*, (May, 1994).

<sup>12</sup> *Seizing Opportunity*, supra, p. 4.

<sup>13</sup> Technology, Research and Telecommunications, *Survey of the Software Industry in Alberta*, (1990), p. 2.



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Alberta for the industry to coordinate its own development strategy, despite efforts to do so. The information technology industry in Alberta has made concerted effort over the last sixteen months at establishing a development plan. It has held two forums for business, research, and educational institutions, resulting in a proposed action plan. This plan calls for an umbrella organization to strengthen the industry, to facilitate greater cooperation amongst industry participants, and to create opportunities for information technology sector development. This umbrella organization could facilitate the development of shared information technology and telecommunications facilities (the costs of which are too great for most firms to bare alone), while ensuring the confidentiality of each user's data. These cooperative efforts must continue from the initial stages of planning, to the construction of the networks, development of the applications, and the availability of a reliable, interoperable network for everyone's benefit. This will reduce duplication of efforts, ensure the appropriate allocation and investment of scarce public and private resources, and maximize the use and benefits of an infostructure.

### **Models for Alberta**

Effective coordinating bodies bring together key stakeholders. Several other jurisdictions have created coordinating bodies that have proved essential to success. Three of the most striking examples are New Brunswick, United States and the Canadian Federal Government.

**New Brunswick.** Frank McKenna created the Ministry for the Information Highway. It has been instrumental in coordinating efforts of the private sector in developing an infostructure as well as attracting technology investment to the province.

**United States.** The White House created the Information Infrastructure Task Force (IITF) and Advisory Council, chaired by the Secretary of Commerce. The Information Infrastructure Task Force is composed of policymakers from departments with extensive involvement with technology issues. It is currently developing a comprehensive technology, telecommunications, and information policy and developing applications that best meet the needs of the agencies and the country. The Task Force is assisted by an Advisory Council consisting of 37 members sitting for two year terms. These members represent industry, labour, academic, public interest group, and government interests. By helping to build a consensus on difficult policy issues, the White House hopes that the IITF will enable agencies and the stakeholders make and implement policy more quickly

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and effectively.

**Canadian Federal Government.** In the spring of 1994, John Manley, Minister of Industry Canada, created an Advisory Council composed of industry leaders and policy makers. Their one year mandate is to establish the priorities of the federal government in this area. It is hoped that this process will also build consensus between representatives of industry, academia, and government that will result in effective development initiatives. Organizations such as CANARIE are also effective models regarding the improvement of network infrastructure.

Other jurisdictions, particularly in the United States, have called on industry to shoulder the burden of infrastructure development, while the government sets the rules for competition. Others, such as Japan, have found success in having the government target market development and encourage private investment accordingly. Alberta must find its own course, for "significant costs are associated with policies that lean too far either in the direction of central control or open competition."<sup>14</sup> Clearly, there is need for greater consultation amongst policy makers and industry leaders to address these issues together, to coordinate, and to cooperate in finding solutions.

### **4.3. Need for Accountability Measures**

"Government must be on-line, networked and user-friendly.

It will change the way we manage benefit programs and government information services. It will change the way we deliver social programs — from health care to education."

- Jon Gerrard,  
Secretary of State  
February 2, 1994

To guarantee successful development of the information technology and telecommunications industry in Alberta, appropriate accountability measures are required. Creating the measures by which success is judged is not new to the Alberta government and is important for creating the development of a world class industry in this province. Consequently, any system of accountability measures must also gauge the province's performance relative to competing infrastructures and their supporting industries. Without such measures, the successful realization of Alberta's information technology and telecommunications vision cannot be determined, assessed, or adjusted to account for changes in technology or competition. An action plan forms the basis from which accountability measures can be developed.

The Alberta government lacks a current or complete action plan or policy position on the development and use of an infrastructure. It lacks goals, vision, a public champion, and methods to coordinate current government initiatives utilizing information technologies and telecommunications. The ongoing efforts of other jurisdictions find the Alberta government rapidly falling behind.

<sup>14</sup> Northern Telecom, "Telecompetitiveness Infrastructure: Enabling a New Future for Canada," (1993), p. 92.

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# 5. The Alberta Government's Action Plan

"[T]he future is information highways, high performance computers and fibre optics - technology that will transform the way Albertans communicate with each other and do business."

- *A Better Way: A Plan for Securing Alberta's Future*, p. 10.

To effectively address the multitude of issues canvassed in interviews and through a literature review, the Government of Alberta requires an action plan. Given the urgent nature of information technology and telecommunications issues, this report takes the liberty of formulating a recommended strategy for the province that addresses those areas where improvements must be made.

## 5.1. Vision

The strategy must be focused to particular goals, based on a guiding vision which could be as follows:

Alberta will be a leader in the development and use of information technology and telecommunications, empowering Albertans to seize opportunities for personal, social and economic growth.

## 5.2. Goals

To successfully implement any vision of telecommunications and information technology within Alberta's economic and social life, goals are needed that address the many pressing issues facing Albertans. Three goals are proposed that will assist the government in addressing these issues. These goals are to:

1. create a culture of use;
2. ensure that the necessary tools are available; and,
3. create the opportunity to add-value.

Each goal is addressed in turn with specific reference made to the strategies that are recommended to achieve each goal.

### Goal 1: Create a culture of use.

In Alberta, there is a growing need for skilled and educated people able to effectively apply and use information technology and telecommunication. Ensuring Albertans have the needed skills will stimulate the activity of local industry, result in more innovative applications of technology, and further the future prosperity and social well-being of the Province.



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"In the 18th century it was recognized that information was the currency of democracy. At the end of the 20th century, information - like money - is power. The haves and have-nots of the next century will be distinguished by their access to information."

- Jon Gerrard,  
Secretary of State  
February 2, 1994

## Strategies for Success

1.1. *Raise Awareness through Education:* Awareness of the benefits of information technology and telecommunications can be enhanced by the Alberta government assuming the role of a model user and information provider. When Albertans become aware of the benefits of information technology and telecommunications, they will become motivated to get the skills they need to apply it to their own lives. Incorporating skills training into educational curriculum in Alberta will accelerate the use and application of the technology by Albertans.

1.2. *Develop Applications:* Applying the technology in health, education, environmental monitoring, research and development, and government services demonstrates the benefits of an infostructure to Albertans. They increase their technology management skills and are made more aware of possible applications, thereby reducing costs and risks associated with finding new and innovative applications for the technologies.

1.3. *Ensure Equity of Access:* Any attempt to create a culture of use requires all Albertans have equal access to the technology, education and training opportunities, and information resources. Geographic and financial barriers should be eliminated through appropriate infrastructure development, and the removal of policy and regulatory impediments.

1.4. *Address Policy Issues:* Making information technology and telecommunications an important Alberta industry requires the government address policy issues. These issues concern such things as the ways in which the Alberta government will employ the technology; how it will promote equity of access for Albertans to use the technology, and how it will relate to the federal government on matters such as rate regulation and the development of public sector applications.

1.5. *Address Regulatory Issues:* Regulations affecting standards for development, conditions for market entry, pricing, and service offerings will determine who has access to the communications infrastructure and where they have access to it. Alberta must examine its regulatory regime to minimize the adverse impact on the development of the infostructure and its supporting industries, to determine where regulatory questions require intergovernmental coordination, and to ensure that Alberta's interests are protected in regulatory proceedings and any change to federal regulations.

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"The communications revolution recognizes each individual as a source of information that adds value to our community and to our economy."

- Vice President Al Gore  
December 21, 1993

## **Goal 2: Ensure the necessary tools are available.**

Equal and open access to the infostructure is critical to creating a culture of use. This requires interconnected, interoperable, and scalable networks, the necessary software tools, and people possessing the skills to navigate on-line and locate information resources and services. Alberta needs to address the rates at which it is creating network connections, educating and training people to use the technology and developing a sustainable local information technology and telecommunications industry.

### **Strategies for Success**

**2.1. *Promote the Development of Applications and Content:*** Building an infostructure requires more than the creation of an adequate and accessible infrastructure and a skilled population. Electronic resources such as useful applications, on-line resources and information are also required. These resources form the content of the infostructure. They can only be created by industries with appropriate infrastructure and skills. Leadership, awareness, and education will create the needed culture of use that will supply the technology and the skills which will enable people to create the resources critical for the continued development of Alberta's infostructure.

**2.2. *Create a World Class Infrastructure:*** Action is needed to provide for sufficient information technology capability and communications network connectivity and interoperability. Alberta has an excellent basic telecommunications infrastructure. However, it is rapidly falling behind other jurisdiction's infrastructures. In Alberta, many institutions and people are, as yet, unable to connect to high-speed telecommunications links, despite proximity to the lines. Standards must be adopted also to facilitate the development of accessible interoperable, scalable infrastructure.

**2.3. *Provide Adequate Training and Education:*** Without provision of training and educational opportunities in the high technology field, the highly skilled workforce or the broadly-based culture of use will not emerge within Alberta. General use and application of the technology will not be likely, and consequently, neither will increased productivity and enhanced social well-being. Technology competence will remain the preoccupation of academics, researchers, and the applied sciences.

"The Avenue for global competitiveness for Alberta . . . lies in having and using knowledge and innovation to create new value-added products for new world markets. The creation and wide-spread use of information technology is a key to the transformation of Alberta from a primarily commodity-based economy to a knowledge-based society."

- InfoPort Facilitation Group,  
*Information . . . The Key to Our  
Future*, p. 2.

### **Goal 3: Create the opportunity to add value.**

Albertans must be allowed to contribute to the development of the infostructure. Information and telecommunications technology has the potential to create long-lasting and dramatic effects on Alberta. Only through cooperative, creative, and thoughtful work will any plan for creating general use and application of technology succeed and enhance Alberta's wealth creation and social well being.

### **Strategies for Success**

3.1. *Provide Leadership:* The government of Alberta spent \$160 million on information technology and telecommunications in 1994-95. It commands great influence over the future of the information and telecommunications industry in Alberta. For the government to use those funds as both a model user of the technology and a model provider of information requires vision and strong leadership. These funds, wisely used, can develop the size and skill of the local information technology and telecommunications industry.

3.2. *Promote Coordination and Partnerships:* Effective leadership calls for the coordination and cooperation of government, industry, academia and the general public. Joint action will improve understanding and awareness of all parties' needs and goals, creating the momentum and synergy needed to meet them. This is precisely what is lacking in Alberta at this time. An umbrella organization could bring together Alberta's small and disparate information technology industry and provide it the atmosphere it needs to grow and develop.

3.3. *Use Everyone's Expertise:* Building a world class infostructure in Alberta requires a great deal of skill, intelligent use of scarce resources, and quick action. The Science and Research Authority's public consultation sessions in Calgary and Edmonton demonstrate that Albertans wish to contribute their expertise and knowledge to building the province for the future. In fact, the best attended sessions discussed the "information highway". Our current infostructure obstacles demand everyone's skills be drawn upon to make Alberta a successful and vibrant information economy.

3.4. *Reduce Duplication of Efforts and Cut Costs* Increasing coordination and creating partnerships will reduce overlapping efforts and



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"We recognize that an advanced information and communications infrastructure will become increasingly essential to job creation and economic growth in Canada.

There is empirical evidence to prove it. Many studies . . . have found that investment in information technologies boosts economic activity."

- Jon Gerrard,  
Secretary of State  
February 2, 1994

duplicated costs. This requires an ongoing inventory of information technology and telecommunications assets in the province. Alberta also can draw upon experiences of other jurisdictions in guiding the development of our infostructure. If a strategy is proven successful elsewhere, there is no reason for Albertans to incur the costs to arrive at the same conclusion. Alberta should model its policies and resources after the best examples in the world, adapted for the Alberta situation.

## 6. Why Act Now?

"We have no choice about the emergence of a global, information economy. We can, however, determine the degree to which we move into this new condition successfully. If we participate passively and just let this transition happen to us, . . . we will likely miss the window of opportunity. . . . On the other hand, if we develop the ability to undertake this journey in a self-guided manner we greatly increase the changes for our long-term success."

- InfoPort Facilitation Group,  
*Information. . . The Key to Our  
Future*, p. 14.

The development of an information technology and telecommunications sector and the diffusion of its products and services in the province is an undertaking of utmost importance. Aggressive use of information technology and telecommunications in Alberta will assist the Alberta government achieve its basic goals of decentralization, and deficit and debt reduction while also generating important economic growth opportunities. These technologies are also central to developing a globally competitive commercial sector. The province will become more attractive to investment, will create highly-skilled jobs, provide new social development opportunities, and increase the effectiveness of the public service while reducing costs to the taxpayer. Other jurisdictions are using information technology and telecommunications in this way with great success.

There is a clear link between the development, diffusion, and use of an information and communications infrastructure and the improved competitive position of businesses using the technology effectively. The enabling effect telecommunications and information technology can have on all sectors of economic activity make these industries central to overall economic prosperity. The development of a healthy and growing information technology and telecommunications sector in Alberta will assist in achieving many of the objectives the Government established in its economic development strategy, *Seizing Opportunity*. Greater use of telecommunications and information technologies in Alberta will assist in wealth creation, deficit reduction, stimulated business growth, expanded exports, and strengthening society.<sup>15</sup>

### 6.1. Wealth Creation

"Business leaders . . . tend to locate their head offices, production facilities, research labs and marketing facilities where the information infrastructure is the most sophisticated."

- Jon Gerrard,  
Secretary of State  
February 2, 1994

Wealth creation in an information economy depends on several important factors, two of which are a well developed infostructure, and a clear information and technology policy. Alberta has a favourable tax environment and is undertaking many deregulatory initiatives. Alberta also has the foundations for a superior information and communications infrastructure, but is rapidly falling behind the ongoing efforts in other jurisdictions. The government now needs to create a clear and coherent policy framework that will make ours a world class infostructure that will attract investment and generate more wealth in Alberta.

### 6.2. Stimulate Business Growth

Information technologies are decisive factors in determining industrial competitiveness in all areas of the economy. The technology allows companies to

<sup>15</sup> *Seizing Opportunity*,  
*supra*, at pp. 6-7.

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overcome barriers of size and geography to compete in global markets. By using technology to engage in electronic commerce, businesses become more efficient, enjoy lower costs and are more profitable. The telecommunications and information technology sectors are increasingly central to the health of business. Such aggressive use of networks and information tools has helped American corporations capture 47.7 percent of global profits and 37.4 percent of global sales between 1987 and 1992.<sup>16</sup>

The Alberta information technology sector is a rapidly growing industry, reflecting its growing importance to the Alberta economy. In 1992, the Alberta industry accounted for \$600 million in revenues and was growing at an average annual rate of 30 percent. The telecommunications and electronics industry generated revenues of \$1.13 billion in 1990. Both of these sectors are playing an ever more important role in the success of small and medium sized enterprises (SMEs) both within and without of Alberta. However, this industry's growth is under threat from larger, extra-provincial enterprises who are making significant inroads in the Alberta market.

### **6.3. Improve Government Service**

Strategic application of the government's 1994-95 information and telecommunications expenditures of \$160 million will greatly assist the restructuring and downsizing of government, and enable the public service to do more with less. Currently, Alberta government employees lack information resources widely available to the general public, such as internet, a global network and information system, and government-wide e-mail systems. If the Alberta government is to be a model user it has to make effective use of widely used resources such as internet. There are several attempts being made in different departments to create province wide networks for such things as health services and education. Effective coordination and cooperation will ensure that these initiatives do not impose duplicate costs on Albertans.

Moreover, Alberta spends significant resources on information technology and telecommunications research. Albertans must be assured that they are benefiting directly from such expenditures. The action plan proposed in this report will assure such accountability.



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## A Call to Action

Current technological and global circumstances require the Alberta government develop and implement an action plan similar to the one proposed herein to develop the information technology and telecommunications sectors. Use it to share a vision of Alberta's infostructure and encourage Albertans to participate in building it, and in turn to build this province's economic future and to enhance its social well-being.

## 7. Conclusion

The state of Alberta's infostructure and policy position is in urgent need of improvement. Because of the central role played by an infostructure in making an economy and society globally competitive, an aggressive plan of action should be adopted by the Alberta government immediately. The rapid pace of technological and economic change provides Alberta a short time frame within which to create a world class infostructure. Not acting now risks the erosion of the Alberta advantage and the loss of an important opportunity that will impose economic and social costs for generations to come.

It is, therefore, the sole recommendation of this report that the Alberta government adopt and implement the proposed action plan.

"[T]he engine driving the new economy is essentially a knowledge-based one. In this new and evolving economy, Alberta is well positioned and equipped to catch and overtake the leaders. While there will be upfront costs to invest in the necessary infrastructure, the costs of delayed entry will be substantive and may never be overcome."

- Representative Committee,  
*Developing Alberta's IT  
Industry*, p. 6.

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## 8. Appendices

### 8.1. "Infostructure" Defined

The term "infostructure" is defined in a number of ways by different agencies. The definition usually reflects the priorities and goals of the government or agency in developing their infostructure. Common to all definitions are the following elements:

- (1) the *current and planned communications networks*, connected in a "network of networks" that link together homes, businesses, governments and institutions;
- (2) the *information and interactive services* available over the network, such as entertainment, education, cultural products, social services, and access to banking, computer, electronic commerce, and business services;
- (3) *software and applications* which enable the operation of computers, the manipulation of data, and which provide access to communications networks and their information; and,
- (4) the *standards and protocols* which facilitate access to or secure the contents of information and networks.

Some governments, such as the United States<sup>1</sup> and the Government of Ontario,<sup>2</sup> and voluntary associations, such as the InfoPort Facilitation Group,<sup>3</sup> also include another criterion in their definitions of the infostructure, namely:

- (5) the *people* who create the needed information technology equipment, peripherals, software and services, provide the information, construct the facilities, and educate others on its use and benefits.

In short, an infostructure is an economic and social development strategy aimed at enabling growth not only in the telecommunications and information technology industries, but also in ensuring sustained economic prosperity in the face of greater global competition. It is with this understanding that this report aims at clarifying the challenges the government must address. It does not address matters better left to the private sector.

<sup>1</sup> The Information Infrastructure Task Force, *The National Information Infrastructure: Agenda for Action. Version 1.0*, (United States: Department of Commerce, 1993).

<sup>2</sup> Advisory Committee on a Telecommunications Strategy for the Province of Ontario, *Telecommunications: Enabling Ontario's Future*, (Toronto: The Queen's Printer of Ontario, 1992).

<sup>3</sup> InfoPort Facilitation Group, *Ibid.*

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## 8.2.: The Enabling Technologies Involved

Infostructures are being constructed with several technologies, the most important of which are information technologies and telecommunications. Both have evolved to the point where they may be interconnected to facilitate the effective sharing of information in electronic form.<sup>4</sup>

### 1. Information Technology

Information technology includes both computer equipment, known as hardware, and the coded instructions that operate the hardware, known as software. Together, advances in these technologies have increased the processing speed, storage capacity and data entry methods of today's computers. Developments in information technology over the last twenty-five to thirty years may be simplified into a three step progression.<sup>5</sup>

The first generation systems were simple databases of information, such as customer information lists. These remain the most widely used systems. At this stage though, users filled out paper forms the information from which was punched onto cards and read into the computer for storage and processing. Computing occurred in the "background".

The second generation of information technologies were on-line information processing. Using terminals, people began to communicate with the system. Forms and punch cards were by-passed. Built-in mechanisms confirmed consistency and guarded against duplication. Rules, introduced as programs in the system, were executed automatically.

The most recent generation emphasizes knowledge-based technology. This development coincides with the introduction of the personal computer. These systems move an increased amount of decision making from people to the machines. For example, a common commercial application of today's computers, running electronic data interchange (EDI) software, can conduct simultaneous inventory and accounting functions, automatically placing orders with suppliers after determining when products are needed.

The Calgary InfoPort Facilitation Group explains that information technology is a set of tools used in adding value to things to create other essential goods and services. It includes not only the technology, but also the people (engineers, material scientists, computer scientists, management professionals, clerks, doctors, lawyers, accountants, and administrators), their efforts (in research, develop-

<sup>4</sup> Intergovernmental Bureau for Informatics, "Informatics: Its Political Impact" IBI Doc. D.G. 1-04, p. 2.

<sup>5</sup> Jon Bing, "IT and the Rule of Law," *Transnational Data and Communications Report* (Jan./Feb. 1992): 13-16, p. 13.



ment, design, engineering, production, use, application, service and training), and the institutions (like banks, stores, hospitals, offices, roads and hotels) required for economic activity and prosperity.

## 2. Telecommunications Technology

The knowledge-based generation of computers would not have been possible without telecommunications technology. Though initially data was transmitted through conventional telephone systems, large users began demanding a variety of telecommunications services that would facilitate fast and easy transfer and processing of data. Telecommunications companies have responded by offering a wide assortment of services besides regular telephone and telex, such as facsimile (fax), call waiting, call forwarding, conference calling, video conferencing, automatic calling, data transmission, dedicated digital circuits, integrated services digital networks (ISDN) and packet-switched data transmission.<sup>6</sup> Transmission now occurs over landline (coaxial cable, fibre optics), microwave, radio, satellite data links, remote sensing satellite, private processing and data transmission networks.<sup>7</sup>

This assortment of telecommunication services may be offered also through banks and multinational corporations as part of the services they provide their clients. For example, most banks now allow their customers to pay bills and transfer funds between accounts over the phone. To provide services and goods to their clients, companies can use databases of information located in other countries that they purchase access to or that they share with another company.

Central to many of the technological advances in the telecommunications field is the digitization of the public network. Digitization means that messages are converted for transmission into binary code instead of analog form. Thus, the distinction between formerly distinct technologies, such as telephone transmission systems, computers, switches, and television sets is lost, allowing the full integration of traditional data processing and communications activities. For example, it is now possible to have one's electronic mail or fax transmissions read over a conventional telephone by a computer in a remote location.

Canada had, by 1980, converted more than 70 percent of intercity telecommunications circuits with digital transmission facilities and has over 80 percent of all local or long-distance calls digitally switched. This early infrastructure development placed Canada in an excellent position to capitalize upon ISDN (integrated services digital network), which allows the simultaneous carriage of several types of (voice, video, data) traffic over a single line. The movement to OSI (Open

<sup>6</sup> United Nations Centre on Transnational Corporations, *Transnational Corporations, Services and the Uruguay Round*, (ST/CTC/103), p. 44.

Christopher J. Millard, *Legal Protection of Computer Programs and Data*. (Toronto: Carswell, Co., 1985), p. 227.

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Systems Interconnection) standards and protocols is also crucial to this development.<sup>9</sup>

A second crucial development aiding technological and service development is the introduction of fibre optic cabling. The increased capacity garnered from fibre optics over conventional coaxial cable, along with the development of packet switching technology, has increased the speed and capacity of network systems to transmit voice, data, and video images. These developments have resulted in the convergence between cable, telecommunications and computer technologies.

### 3. Effects of Converging Technologies

The merger of computer and communications technologies has created several products not widely available until recently, such as on-line electronic databases and information systems, processing services such as airline reservation systems, inter-banking systems and electronic fund transfers, and messaging services such as electronic mail and electronic data interchange (EDI).<sup>10</sup> Now there is a burgeoning international trade in information and data processing services that include several traditional and emerging products. For example, news, health services, education, agriculture, manufacturing, transportation, marketing, credit, banking and finance, accounting, insurance, law enforcement, and every government function from security to weather prediction and disaster relief are now available through on-line networks.<sup>11</sup>

Not only has the convergence of information and communications technologies resulted in many new services, but they have also blurred the lines between heretofore distinct industries. Presently, telecommunications companies offer computer and cable services; cable companies offer electronic services such as e-mail; and, electronic networks carry radio and television broadcasts as well as voice and video traffic. The industry has grown to encompass telecommunications and cable equipment and services, computer and office equipment, software and computer services, instrumentation, microelectronics and consumer electronics.

\* In fact this is being argued by the Stentor group, who would like to see the union of phone, cable, computer and satellite networks into a seamless system open to all users. See Jim Bronskill, "New national electronic highway rivals rail links of 19th century," *The Edmonton Journal* (November 18, 1993), p. A3.

<sup>9</sup> *Communications for the 21st Century*, *supra*, p. 48-9.

<sup>10</sup> United Nations CTC, *supra*, p. 44.

<sup>11</sup> Millard, *supra*, p. 227.

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### **8.3.: Current Alberta IT/Telecommunications Activities**

The infostructure is being used for several purposes in both the private and public sectors. Though the undertakings described are significant, it must be remembered that Alberta is falling behind other jurisdictions with regards to the activities in electronic commerce, and public sector applications in health, education, research, and government services.

#### **(1) *Electronic Commerce***

The private sector is using information technologies and telecommunications to conduct electronic commerce. Electronic commerce comprises interconnected networks; advanced computer hardware and software; established business transactions, data exchange and interoperability standards; accepted security and privacy requirements; and appropriate managerial and cultural practices. These technologies and approaches will enable businesses and consumers to interact with information rapidly, flexibly, and securely. These are the technologies enabling greater global competitiveness and wealth creation.

As demand for business services grows stronger, the infostructure is conceived by many as becoming an important mechanism by which access to banking, shopping, and business transactions is available. Electronic commerce has many benefits for both consumers and businesses, among them,

- reduced purchase prices due to increased competition;
- reduced errors, time and overhead expenses in the reprocessing of data;
- reduced costs to suppliers by locating and contracting for business electronically;
- the creation of new markets both locally and abroad by reaching new potential customers;
- easier market entry into different geographic locations;
- improved quality and variety of goods through the standardization of specifications and expanded market opportunities;
- faster production cycles from product conception, design, through to commercialization;



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- optimized resource selection by greater inter-corporate coordination and the application of labour to more creative business endeavour;
  - reduced inventories as a result of just-in-time manufacturing and delivery;
  - lowered overhead costs from automation, large-scale integration of management and the creation of more efficient processes;
  - greater customer involvement in the development of products and services; and,
  - reduced use of environmentally harmful materials with the greater movement of information.

In essence, electronic commerce reduces business costs by enabling faster introduction of new products, defining more precise target markets, and locating new markets quickly.

Electronic commerce is already quite common in Canada. For example, 1-800 access and computer-driven access systems allow businesses of any size to handle customer inquiries and gather crucial market information. Financial institutions are introducing paperless electronic transaction services to improve the speed and availability of services. Large retailers like Sears and also the federal government are using electronic data interchange (EDI) to establish efficient and rapid transaction links with suppliers, facilitating electronic purchase orders, shipping notices, invoices, messaging and other operations. Other provinces like New Brunswick are stressing call centres as an important way to attract electronic commerce to the province.

The United States, already a dominant user of electronic commerce, plans to use it in on-line, electronic funds transfers, government regulatory data interchanges, collaborative engineering, enterprise integration, and computer-supported collaborative work.

### **Activity in Alberta**

Many companies are now using electronic commerce in Alberta. To illustrate with a few examples,

- HPC High Performance Computing Centre (HPPC) provides Alberta businesses with access to supercomputer capacity so useful in simulations

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and modeling. HPCC also uses HPCNet/OilNet for increased accessibility to its resources and services for Alberta and Canadian businesses;

- as of December, 1994, eight Alberta-based commercial internet service bureaus competed with 56 extra-provincial internet service companies to assist Alberta businesses make electronic commerce central to corporate operations;
- AGT Inc. and Pizza Hut collaborated on the development of call-routing software which transfers a call made to the province wide phone number to the outlet nearest to the caller's location;
- Levis Canada now allows customers to order custom-made denim jeans by entering four measurements into a computer. They receive the order a couple of weeks later.

Several new public needs have emerged with the development of the infostructure. Generally, these concern:

- the demand for electronic services, particularly in health care and education, which requires greater access to networks,
- the demand for training and educational opportunities empowering people in the use of new technologies, and
- the growing demand for software tools to serve information needs.

Alberta has developed a well-educated workforce that is information and technology literate. The energy industry has created an information technology sector of enormous potential. There exists a significant culture of use in business, academia, and government services such as education and health.

The information technology sector in Alberta is still in the formative stages of development. Applications exist because they are demand driven. There is a need for an Alberta information technology strategy addressing diverse elements of all the different audiences to which this vision is directed. Some of the initiatives undertaken already include:

- The InfoPort Facilitation Group consisting of industry leaders. It proposed an infostructure development strategy for Alberta and the creation of a Centre for Information Technology to gather the industry together to create new technologies and applications;

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- Information Technology Sector planning proposals presented to the Alberta government for the development of required infrastructure; and,
  - The FreeNets in Calgary and Edmonton, which became available to the general public in the fall of 1994, providing easy access to community-based computer network systems, information and electronic mail. Two more are planned for Red Deer and Medicine Hat.

These undertakings indicate that there is industry support for the development of an infostructure, that the information technology industry is willing to assist in its construction, and that the general public wants such an infostructure. What is hampering these activities is the lack of concerted and coordinated effort to develop a comprehensive and coherent development strategy. Government facilitation of a strategic planning process is required to coordinate and encourage the faster development of the infostructure in Alberta.

Many policy makers have used certain applications as opportunities to provide leadership and coordination while also enhancing social well-being. Of the many applications a few general categories have been singled out in Canada and elsewhere as having an especially significant social impact. These are applications, affecting health care, education, government services, and environmental monitoring.

## *(2) Health Care*

Though Canadians benefit from one of the best health care systems in the world, soaring costs threaten the high standards of care to which we have become accustomed. An infostructure could be used for many health care applications that could reduce costs an estimated \$6 billion across the country.<sup>12</sup> The applications most amenable to automation include:

- records management;
- sharing of diagnostic data between physicians and hospitals;
- facilitating rural access to specialists;
- assisting with public health education;
- assisting with medical education, training, and upgrading; and,
- automating billing and payment functions.

<sup>12</sup> Stentor, *The Information Highway: Canada's Road to Economic and Social Renewal*, (Ottawa: Stentor Telecom Policy Inc., 1993), p. 17.



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Already applications are being developed around the world that generate many benefits. In Canada a sample of these applications can be found:

- in Manitoba, where hospitals can rapidly exchange diagnostic data;
- in British Columbia, where hospitals have high-speed, two-way video teleconferencing for training and video imaging, enabling simultaneous discussion of sample tissues and instruction;
- in New Brunswick, where patient records, financial information, lab schedules and results, admissions and discharge records and material management records are linked together throughout eight hospitals; and,
- in Ontario, where multimedia technology is being developed to assist physicians and hospitals to provide easy access to patient data and laboratory results as well as educate medical students with 250 separate training modules.

### Activity in Alberta

Alberta's world class medical research often results in new technologies and processes that enhances the quality of care provided to Albertans. Information technologies are now also being creatively employed in health care. Currently, Alberta is testing a Remote Consultative Network that facilitates discussions between rural practitioners and specialists at the University of Calgary using audio, video, imaging and data transmission services. It is applications like these which will develop Alberta's capacity to respond effectively to new and emerging health issues and needs and to meet the goals outlined in Alberta Health's report *Health Goals for Alberta*.<sup>13</sup> Notwithstanding these efforts, Alberta currently does not have a comprehensive strategy for applying information technology and telecommunications to healthcare.

#### (3) *Research, Education and Training*

Probably the area most acutely affected by technology is research, education and training. Economic development rests on the effective development of new knowledge through research, on a highly educated, computer literate population with a lifelong desire for knowledge, and on a corporate community that understands the benefits of making investments in training programs. Technologies such as learning resource software, multimedia, electronic libraries, on-line

<sup>13</sup> Alberta Health, *Health Goals for Alberta: Progress Report* (December 1993).

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courses, electronic museums, specialized databases and electronic communications are transforming research and educational methods.

**Research and Development.** Using networks enhances research activities in academia, government and industry. Studies show results are of a higher quality and are developed more efficiently.<sup>14</sup> Electronic networks broaden the scope of a researcher's activities, increasing the scope of available resources and people, as well as creating new and faster methods of sharing results which facilitates technology transfer and commercialization.

### **Activity in Alberta**

Alberta has a number of ongoing initiatives to ensure that research and development activities occur with access to the necessary technology infrastructure.

**WurcNet/Wnet.** The Western University Research Consortium on High Performance Computing and Networking (WurcNet) is a consortium of companies and institutions dependent on access to high performance networks. Key Alberta parties include HPCC, AGT, Ed Tel, and the universities of Calgary and Alberta. Its goals are (1) to connect Western Canadian universities with high-speed networks; (2) to develop network applications; (3) to promote collaboration between producers and consumers of networking and computing; and, (4) to include projects covering such areas as health care, seismic processing, telecommunications, theatre visualization and distance education. Funding to achieve these goals is from CANARIE, NSERC (Natural Sciences and Engineering Research Council), and CAPA (Canada-Alberta Partnership Agreement). By the end of 1994, Wnet's network included 2 T-3 telecommunications links between Edmonton and Calgary and OC3 networks in place and undergoing testing. Wnet will soon provide 155 Mbps data transfer speeds across the prairie provinces.

**HPCC.** HPC High Performance Computing Centre (HPPC) is a not-for-profit, industry led consortium based in Calgary. It opened its doors in 1993 with a mission to provide high performance computational services to scientists, industrial researchers and commercial users in Alberta and across Canada. It uses a Fujitsu VPX 240 vector supercomputer capable of performing up to 2.5 billion computations per second (2.5 Gigaflips) with a high speed main memory of 5 million bytes, a secondary memory of 1 billion bytes. When installed it became the only publicly

<sup>14</sup> Office of Technology Assessment, *The National Research and Education Network: Research and Policy Perspectives*, (New York: Syracuse University, School of Information Studies, 1991).

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accessible, super-computer facility of its stature in Canada. All revenues are reinvested in a technology renewal fund to ensure it maintains this reputation. HPPC is connected on an OC3 ATM telecommunications link from Calgary to Edmonton, as part of the CANARIE infrastructure. This link also provides access to the other provinces across Canada. HPCC is looking to create a joint venture partnership with ORTECH (Ontario Research Technology) Centre near Carleton University in the near future. As mentioned above, HPCC has also pioneered and continues to operate HPCNet/OILnet, a commercial ATC (OCR) network to provide businesses with high speed access to the super computer services and technology. HPCC, in conjunction with Alberta Supernet, provides a secured Internet access to its customers on HPCNet. Fujitsu Canada and HPCC manage a \$1,000,000 per year scholarship and special research project program with users across Canada.

**ARnet.** Alberta Regional Network (ARnet) is a not-for-profit consortium of universities and the Alberta Research Council. ARnet consists of a link within Edmonton to the University of Alberta from the ARC, a link from Edmonton to Athabasca, and from Edmonton to Calgary. The University of Calgary is linked to the ARC CA\*Net node. Most links are made with 56 kbps. Recently, a study has been completed on upgrading the network. Its recommendations are currently under review.

**CANARIE/CA\*Net.** In June 1993, the Canadian Network for Advancement of Research, Industry and Education (CANARIE) was created. CANARIE is key to the development of the information highway as it is a prototype for the large-scale public and private sector collaboration required. Its goal is to connect researchers and educational communities across Canada by 1999 with a high-speed broadband highway and upgraded gateways to the Internet and other international networks. Phase I, to be completed by March 1995, will upgrade CA\*net to T-1 lines (1.54 MB/s). It is also hoped that it will accelerate the development of new network products, applications and services. The third objective is to create a high-speed experimental test network. Total cost for Phase I is \$115 million (Government \$26 million; private sector \$89 million). \$80 million in funding for Phase II has recently been granted for further projects.

**Stentor Beacon Initiative.** The 10 largest telecommunications carriers are investing \$8 billion over 10 years to upgrade Canada's local phone



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networks. \$500 million will be spent over the next 6 years in an enhancement program to purchase and install approximately 100 ATM switches. This initiative will create 12,000 new jobs and give 80-90% of all businesses and homes direct access to new services. MMI (Multimedia Inc.) is to be created to acquire, develop and market multimedia applications and services. As well, \$50 million will be dedicated to a new venture capital company to seed multimedia initiatives. Alberta will benefit directly from the efforts of Stentor and its member companies.

**Education and Training.** The teacher's role is changing from an interpreter and conveyor of knowledge to a facilitator of active learning when access is provided to new resources located in Alberta and abroad, such as on-line libraries, electronic museums, and electronic archives. The technology also allows peer-to-peer student interaction that overcomes geographic barriers. Distance delivery of instruction over the information highway is another important benefit. With the dramatic increase in information, new tools are required components for the education of our society and facilitate and enrich educational pursuits. If educational and social institutions fail to take advantage of these new tools, they will be left behind. Similar benefits await businesses employing advanced telecommunications and computer technology to train employees.

### **Activity in Alberta**

The Government of Alberta acknowledges the educational challenges that technology has created and is moving to better meet the educational needs of Albertans. Advanced Education and Career Development's recently released document, *New Directions for Adult Learning in Alberta*, establishes four goals central to adult education: accessibility, responsiveness, affordability, and accountability. Several strategies aim expanding the role of learning technology and alternate forms of program delivery to create more opportunities to learn; encouraging private sector participation in developing more employee training opportunities; improving information and counselling services to assist Albertans make effective decisions regarding learning opportunities; and developing an electronic application service to enable public post-secondary institutions to better serve Albertans as they seek admission to learning programs.

The development and deployment of interactive video links between classrooms at the Universities of Calgary and Alberta allow students at either institution to take classes from professors teaching at the other.

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Distance learning opportunities have improved for secondary students with the continued automation of the secondary curriculum by Alberta's Distance Learning Centre. Many schools, too, recognize the value in distance learning opportunities with an increasing presence on the internet. The development of FreeNet networks in the province provide Albertans who are not students, easy access to much of the same electronic information and communications facilities.

The Free-Net Associations in Calgary, Edmonton, Medicine Hat, and Red Deer are guided by the assumption that universal access to advanced information services and computer networks is a defining characteristic of an information-based economy. Edmonton and Calgary now have operational networks accessible to users at very affordable rates. The networks connect users to a host of databases and provide access to Internet, the global computer network. These projects are aimed at reducing the costs of using and providing electronic information and services. However, FreeNets do not and cannot provide broadband services needed to take full advantage of the information and resources available due to prohibitive costs and the lack of available bandwidth.

**Libraries.** Any infostructure requires the development and availability of information resources, such as those found in libraries. Libraries are using networking technology to overcome budgetary pressures and space limitations while meeting growing information demands and a burgeoning supply of published sources. To effectively provide information electronically and remotely, libraries need interoperable networks, decentralized processing of information, databases of archive information, navigation and retrieval tools, delivery systems of photocopy or digital copies, mass storage facilities, and trained personnel able to operate these systems. By becoming important repositories of electronic publications, libraries will be able to become information providers and enhance the quality and effectiveness of research and education.

### **Activity in Alberta**

Alberta possesses several on-line electronic library catalogues. The University of Alberta's NEOS (Networking Edmonton's On-line systems) has facilitated the sharing of resources and catalog information amongst Edmonton's libraries. The Universities of Athabasca, Calgary, and Lethbridge, Lethbridge Community College, and Medicine Hat College also have on-line catalogues. All of these libraries provide patrons with

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access to CD-ROM information and document databases too.

#### **(5) Government Services**

Government will not be immune from the changes resulting from the development of an infostructure. In fact, there are great opportunities to redesign the methods by which government services are delivered to citizens, to make publicly available useful information and to review policies and regulations that may impede the development of an infostructure. Applications developed for the public sector can be grouped into five different categories:

- *Information services:* the provision of government information and services as well as a method by which the general public can vote and provide input into public policy making.
- *Health care applications:* as discussed above, these applications can include remote diagnostics, patient information sharing, and training.
- *Law enforcement services:* such as teleconferenced parole hearings and national sharing of criminal data.
- *Research and education applications:* as discussed above, distance instruction, shared electronic resources, and on-line libraries.
- *Labour force development:* flexible training programs offered electronically to keep the labour force highly skilled and constantly up to date.

Examples of these different applications include:

- the adoption of electronic data interchange (EDI) by the federal government to allow for electronic income tax filings, while shortening cycle times of accounts payable and receivable; and,
- public information kiosks in Ontario that enable renewals of motor vehicle registrations at a dramatically reduced cost.

#### **Activity in Alberta**

- The Alberta Government is currently tied to the Federal Government's Open Bidding System which allows electronic tendering of contracts across Canada. Requests for Proposals are available electronically and are bid on electronically;



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- Alberta is in the process of developing a Common Electronic Document Interchange System (CEDIS) that will facilitate similar applications across the Alberta Government;
  - Alberta Public Works, Supply and Services is conducting an information and technology audit of the Alberta government to facilitate the creation of a government-wide technology strategy; and,
  - The Science and Research Authority is making information technology and telecommunications central to its operations. It is committed to being a model technology user and information provider. The Authority's Board of Management is implementing electronic groupware systems to facilitate working together from remote locations and at different times. The Board's Secretariat is in the process of becoming an information provider on the Internet.

#### *(6) Environmental Monitoring*

The collection and analysis of information of environmental trends has also been seen, particularly in the United States as an important application for their infrastructure. The collection of information about the environment is important for natural resource management, control and monitoring of environmental hazards, and guaranteeing sustainable development.

Applying information technology to environmental issues is seen as a great benefit to several groups. In particular, the American government stresses the importance of environmental monitoring for:

- the agricultural sector in the assessment of economic impact of ecological problems and assistance in planting and harvesting decisions;
- the construction industry for environmental parameters on building codes;
- the retail industry in targeting product sales and marketing strategies;
- the legal profession in settling questions of liability as a result of environmental disasters;
- the insurance industry in assessing risks resulting from natural disasters;

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- electric power utilities to locate power plants, plan for fuel consumption and anticipate power outages; and,
  - consulting services developing value-added products aimed at specific industry needs, such as crop health information.

### **Activity in Alberta**

In 1974, Alberta Environment created the Alberta Remote Sensing Centre. It is linked to other remote sensing centres across Canada and around the world. The Centre uses measurement data gathered by satellites and aircrafts to survey and manage Alberta's natural resources. It serves as an important source of information for many natural resource activities including environmental assessment, natural resource inventory, rangeland management, and geological and climatic monitoring. The Centre also provides training on specialized topics to facilitate transfer of technology and research findings to those industries dependent upon the Centre.

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## 8.4.: List of Persons Interviewed<sup>v</sup>

AGT Ltd.

Mr. J.S. Webb, Senior Vice President,  
Marketing and Business  
Development

Mr. Larry Pratt, Senior Vice President,  
Government and Regulatory Affairs

Alberta Distance Learning Centre

Mr. Garry Popowich, Director

Alberta Public Works, Supply & Services

Mr. Stan Petrica, Executive Director

Alberta Research Council

Dr. Brian Barge, President and CEO

Calgary Research & Development

Authority

Mr. William Croft, President

Canada West Foundation

Mr. David Elton, President

HPCC

Mr. Paul Davis, President

Mr. Gordon McNabb, Chairman

Intera Information Technologies

Mr. Brian Bullock, President and  
CEO

InteCura Consulting Ltd.

Ms. Patricia Glenn, President

Milner Fenerty

Mr. Fred Stewart, Q.C., Partner

Northern Telecom

Mr. David Buffet, Account Vice  
President, Alberta

Pulsonic Corporation

Mr. Hugh Stanfield, President &  
CEO

Shaw Communications

Mr. Michael D'Avella, Vice-  
President, Planning and Regulatory  
Affairs

Telecommunications Research Labs

Dr. Michael Leung, Vice President,  
Business Development

Telus Corporation

Mr. Neil Webber, former CEO

Faculty of Medicine,

Dr. Moe Watanabe, Professor

University of Calgary & Member,

Canadian Information Highway

Advisory Council

<sup>v</sup> Various officials in  
Economic Development and  
Tourism have provided  
background information on the  
subject of information technol-  
ogy/telecommunications.



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